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10/718,824	11/21/2003	Lav Ivanovic	030928/2935P	1337

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Sandeep Jaggi  
LSI Logic Corporation  
Intellectual Property Law Dept.  
1621 Barber Lane, M/S D-106  
Milpitas, CA 95035

EXAMINER
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JANAKIRAMAN, NITHYA

ART UNIT	PAPER NUMBER
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2123

MAIL DATE	DELIVERY MODE
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08/29/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/718,824

Applicant(s)

IVANOVIC ET AL.

Examiner

Nithya Janakiraman

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2123

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 6/20/07.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

This action is in response to the submission filed on 6/20/07. Claims 1-20 are presented for examination.

#### ***Response to Arguments-Objections***

1. Applicant's amendments filed 6/20/07 have been received, and the objections have been withdrawn.

#### ***Response to Arguments-35 U.S.C §112***

2. Applicant's arguments, see pages 7-8, filed 6/20/07, with respect to claims 5-8 and 15-18 have been fully considered and are persuasive. The rejections of claim 5-8 and 15-18 under 35 U.S.C. 112, second paragraph have been withdrawn.

#### ***Response to Arguments-35 U.S.C §102***

3. Applicant's arguments filed 6/20/07 have been fully considered but they are not persuasive.

4. Applicant claims that Windt:

"...fails to disclose calculation of the optimal reflectivity value with a plurality of parameters designated as independent variables."

However, Applicant openly admits:

"On pp. 366-367, Windt discloses that up to *eight independent variables* can be designated *simultaneously*."

In addition, as shown in the example in Part B, Variable Designation on page 366, a number of independent variables can be used for all calculations. Thus, Windt discloses "obtaining the

optimal reflectivity value by calculating a cost function R+S using the *plurality of independent variables at once.*”

5. Applicant also argues that:

“Windt discloses that multiple independent variables can be designated but does not disclose how these independent variables are used in the calculation of the reflectivity value.”

Applicant is respectfully reminded that limitations from the disclosure cannot be read into the interpretation of claims. *Usage* of the independent variables in the calculation is not a claimed limitation. Nonetheless, usage of the independent variables is shown on page 367 as Windt states “For every independent variable so designated, the user must define the extent and resolution of the grid of points over which the optical functions are to be computed.”

6. Finally, Applicant argues that Windt does not disclose “calculating an extrema for a cost function of reflectivity R using the input parameter values” and that:

“Windt discloses determine[sic] the optimized values of the design parameters, which is not analogous to the extreme (minimum and maximum) for the cost function of reflectivity R.”

However, as shown on page 370 Windt discloses the ability to “allow the user to further analyze interactively the computed optical function (e.g., minimum and maximum values, feature widths, averages, integrals, etc.” Thus, Windt discloses “calculating an extrema for a cost function of reflectivity R using the input parameter values”.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-20 are rejected under 35 U.S.C. 102(b) as being anticipated by “IMD- Software for Modeling the Optical Properties of Multilayer Films”, Windt (hereinafter Windt).

2. Regarding independent claim 1 (and 11), Windt teaches:

A method (computer-readable medium) for obtaining an optimal reflectivity value for complex multilayer stacks (see page 368, column 1), comprising:

(a) generating a model of a multilayer stack and parameterizing each layer by a thickness and an index of refraction (see Introduction, ‘Reflection and transmission at an ideal interface’);

(b) allowing a user to input values for the parameters and to designate a plurality of the parameters as independent variables (see page 365, ‘User Interface’);

(c) calculating an extrema for a cost function of reflectivity R using the input parameter values (see Windt, page 368, column 1);

(d) calculating sensitivity values S for the extrema (see page 360, “the relative sensitivities of the optical functions to the parameters that describe the multilayer structure”); and

(e) obtaining the optimal reflectivity value by calculating a cost function  $R+S$  using the plurality of independent variables at once (see page 362, column 1, “...the reflectance can be reduced equally well by either a rough interface, in which the transition between the two materials is abrupt at any point or a diffuse interface, in which the index varies smoothly along the z direction or by an interface that can be described as some combination of the two cases”; equations 4, 5(a). In this case, ‘sensitivity’ is equivalent to the diffuseness/roughness variable  $\sigma$ , which is used in the reflection coefficient modification factors  $w^{\sim}(s)$ ).

3. Regarding claim 2 (and 12), Windt teaches:

The method (computer-readable medium) of claim 1 wherein step (e) further includes the step of:

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calculating the cost function as  $R + \alpha S$ , where  $\alpha$  is a weighted parameter (see page 364, “weighting factors”).

4. Regarding claim 3 (and 13), Windt teaches:

The method (computer-readable medium) of claim 1 wherein step (a) further includes the step of: providing the multilayer stack with N layers, where a top layer comprises a top ambient resist layer followed by one or more layers of materials that are patterned over a substrate layer (see page 362).

5. Regarding claim 4 (and 14), Windt teaches:

The method (computer-readable medium) of claim 2 wherein step (a) further includes the step of: providing the index of refraction to include a real and an imaginary number (see page 361, column 1).

6. Regarding claim 5 (and 15), Windt teaches:

The method (computer-readable medium) of claim 4 wherein step (a) further includes the step of: providing a  $j^{\text{th}}$  layer with thickness  $d_j$ , and a complex index of refraction  $n_j = n_j - i k_j$  (see ‘Optical functions of a multilayer stack’).

7. Regarding claim 6 (and 16), Windt teaches:

The method (computer-readable medium) of claim 5 wherein step (a) further includes the step of: providing the ambient and substrate with complex indexes of refraction:  $n_0 = n_0 - i k_0$  and  $n_{N+1} = n_{N+1} - i k_{N+1}$ , respectively (see ‘Reflection and transmission at an ideal interface’).

8. Regarding claim 7 (and 17), Windt teaches:

The method (computer-readable medium) of claim 6 wherein step (a) further includes the step of:

defining reflectivity at an interface between two layers as a cost function, wherein the reflectivity  $R_j$  at a  $j^{\text{th}}$  interface (between the  $(j-1)^{\text{th}}$  and  $j^{\text{th}}$  layers) is a function of  $3(N-j+1)+4$  parameters, which are;  $n_{j-1}, n_j, \dots, n_N, n_{N+1}; k_{j-1}, k_j, \dots, k_N, k_{N+1}; d_j, d_{j+1}, \dots, d_N$  (see Figure 3, 'Optical functions of a multilayer stack', 'Optical constants determination for a thin film').

9. Regarding claim 8 (and 18), Windt teaches:

The method (computer-readable medium) of claim 1 wherein step (b) further includes the step of:

allowing the user to enter values for the thickness and the complex indexes of refraction ( $n$  and  $k$ ) for each layer, including a current starting point, a minimum values, and a maximum value for the thickness and the complex indexes of refraction for each layer (see 'User Interface', 'Summary').

10. Regarding claim 9 (and 19), Windt teach:

The method (computer-readable medium) of claim 8 wherein step (b) further includes the step of:

allowing the user to enter step values for the parameters designated as independent variables, wherein those parameters that are not designated as independent variables are fixed (see 'User Interface').

11. Regarding claim 10 (and 20), Windt teach:

The method (computer-readable medium) of claim 1 wherein step (e) further includes the step of: defining the sensitivity as  $S=(\text{Max } R - \text{Min } R)$  for all varied parameters (see page 364, "a constraint on the range of acceptable parameter values can be specified as well", 'Confidence interval computation').

***Conclusion***

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nithya Janakiraman whose telephone number is 571-270-1003. The examiner can normally be reached on Monday-Thursday, 8:00am-5:00pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on (571)272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR



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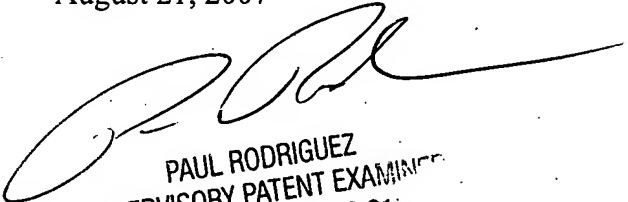
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Nithya Janakiraman

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August 21, 2007

NJ



PAUL RODRIGUEZ  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2123